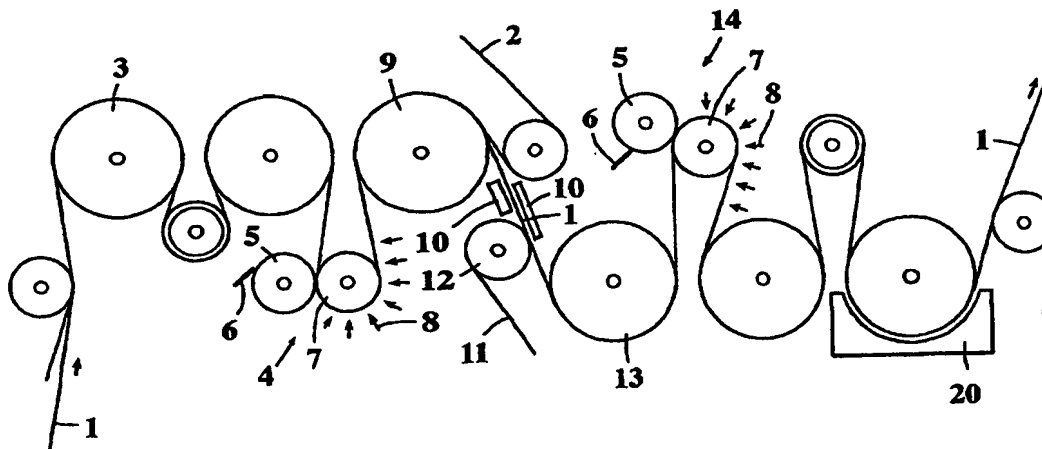


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(54) Title: METHOD AND ASSEMBLY FOR SUPPORTING A PAPER AND BOARD WEB IN FINISHING EQUIPMENT



## (57) Abstract

Method and assembly for supporting a web (1) during the postprocessing of a web of paper or board, in which method the web is passed from a preceding device to at least one next downstream located web treatment device (4) wherein to at least one side of the web (1) is applied a treatment agent causing wetting of said side of said web, and the web (1) exiting said web treatment device is passed to at least one dryer means (8). The web (1) is contactingly supported in a continuous and unbroken manner at least from said web treatment device (4) to said dryer means (8). Advantageously, the web (1) is dried by means of at least one dryer (3) before taking the web to the web treatment device (4), and the web is contactingly supported in a continuous and unbroken manner at least from said dryer means (3) preceding said web treatment device (4) to said dryer means (8) located downstream next to said web treatment device.

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## Method and assembly for supporting a paper and board web in finishing equipment

The invention relates to a method according to the preamble of claim 1 for supporting and passing webs such as paper and board webs in a contacting manner in a paper/board machine in which the base web forming section is immediately followed by web finishing devices for immediate treatment of a web leaving the base web forming section.

The invention also concerns an assembly suited for implementing said method.

With the increasing demands on higher web speeds and quality, well-behaved supporting and drying of a running web are becoming increasingly important in paper and board manufacture. Therefore, it is desirable to pass the web in a continuously or at least partly supported manner over a maximally long total distance of its travel in the web finishing sections. The technique used for web support also affects the drying process of the web. As web breaks occur more easily in a wet web than in a dry web, unsupported passages of the wet web over the distance from one support member to the next, before the wetted web is dried, represent potential points of web breaks. If the web can be supported in a contacting manner as long as the web is wet, the number of web breaks can be reduced. Simultaneously, the coating of the web may also be carried out at a higher moisture content and thus in a state of weaker tensional strength than has been possible in the prior art. As a result of processing the web at said higher moisture content, substantial savings can be attained in regard to both the overall energy consumption and investment costs of the dryer equipment. Further, as the specific drying capacity required in the different process steps for obtaining

sufficient strength qualities of the web is not set any more, the moisture content of the web can be kept optimal with respect to the desired end product qualities throughout the manufacturing process.

5

In US Pat. No. 5,547,509 is described an apparatus for supporting a paper web during the application step when the web is passed through the coating and doctoring installation. In this embodiment, the coating applicator may be, e.g., an application roll and the web is passed onto a support belt before it enters the nip of the applicator and, after application, is passed in a supported manner to the dryers. The function of the support belt is to reduce the number of web breaks in application and doctoring as well as along the web passage from the doctor blade to the dryers. The dryers are of the non-contacting type and the web is supported over its passage between the dryers by means of small-diameter support rolls. The supported portion of web travel covers the applicators only. Before entering the applicator and during drying, the web runs unsupported. Furthermore, as the application takes place using an applicator roll, the entry of the web to the applicator roll is very complicated, because the applicator roll (kissing roll) of a roll applicator must be arranged to rotate in a coating mix pan, which necessarily requires the applicator roll to be the lower roll in the roll nip and, as a result, the coated side of the web to be the underside of the web entering the applicator nip. Obviously, passing the web to one applicator is simple along a straight path, but as the web is conventionally coated on both sides, reversing the web travel for coating the opposed side requires a complicated guide roll set in which the web cannot be supported by any practicable means using a support wire or belt.

35

In German patent publication no. 44 20242 is described an

application method in which the web is coated in a film-transfer coater and then passed over the backing roll to a drying cylinder. Operating in conjunction with the backing roll, there is arranged an unrestrained type of  
5 dryer and from the backing roll the web is passed to a wire-supported dryer cylinder. While the wire in this embodiment is supportedly passed through the dryer cylinder section, the most critical passage with respect to web breakages, that is, the web travel within the area of  
10 the applicator and the first dryer unit, is passed only supported at the support rolls. Since the web has no continuous support when it is wet and hence has the lowest strength, this kind of web supporting offers no substantial contribution to web runnability and lesser  
15 number of web breaks.

It is an object of the present invention to provide a method for implementing a fully-supported travel of a web running on a wire or belt through the coating applicator  
20 and also, at least partially supportedly, during subsequent drying.

The goal of the invention is achieved by passing the web to a coater station or other web treatment device in  
25 which the web will be wetted and, further, to at least the first dryer located next downstream to the coater in a continuously contactingly supported manner.

According to a preferred embodiment of the invention, the  
30 web is passed in a continuously contactingly supported manner from a dryer preceding a coater to a dryer located next to the coater in the downstream direction of web travel.

35 According to an embodiment of the invention, the web is passed from a dryer preceding the coater to a dryer located next to a coater in the web downstream travel

direction with the help of a single continuous support means.

5 According to an embodiment of the invention, the web is passed to at least one coater with the help of the support means of the upstream preceding web treatment device.

10 According to the most preferred embodiment of the invention, the web is passed to a coater from the upstream preceding web treatment device in a supported manner and only partially dried.

15 More specifically, the method according to the invention is characterized by what is stated in the characterizing part of claim 1.

20 Further, the assembly according to the invention is characterized by what is stated in the characterizing part of claim 32.

The invention offers significant benefits.

25 Continuous belt or wire support can effectively reduce the number of web breaks occurring in the manufacture of paper grades having a low basis weight. Additionally, the support embodiment according to the present invention based on belt-supported web travel permits the web to be passed to a coater only partially dried, because this  
30 arrangement eliminates the risk of breaks in a wet web. In this context, the term partially dried web must be understood to refer to a web having a moisture content essentially higher than that of the finished end product. In this manner, the drying process of the base web and  
35 its coating in the manufacture of a paper/board grade can be optimized so as to achieve a maximally high quality of the finished end product. As a result, the coating pro-

cess can be carried out at the optimum moisture content with respect to the desired qualities of the coated paper/board product, specific energy consumption and the drying requirements of the base web and its coating, as well as with respect to the investment cost of drying capacity and the overall efficiency of the manufacturing process. By contrast, in prior-art embodiments it has been mandatory to pass the base web in a rather dry state into the coater in order to avoid web breaks. In practice, this has required the moisture content of the base web leaving the papermaking machine to be substantially equal to that of the finished end product.

In the following the invention will be examined in greater detail with the help of the appended drawings in which

Fig. 1 shows diagrammatically a first coater/dryer arrangement according to the invention;

20

Fig. 2 shows diagrammatically a second coater/dryer arrangement according to the invention; and

Fig. 3 shows a preferred coater arrangement utilizing an embodiment according to the invention.

25

It must be noted that the term coater in the context of the present invention is used in a broad sense including also size presses and other web treatment equipment in which a material is applied to the surface of a web in a manner causing an increase of moisture content in the web.

30

Referring to Fig. 1, a web 1 in the arrangement illustrated therein is passed to the applicator section of a coater directly from a forming section supported by a dryer wire 2 of the papermaking machine. Obviously, the

35

same arrangement may also be used in conjunction with a board making machine. At the end of the dryer section of the papermaking machine, the web 1 passes supported by a wire 2 over dryer cylinders 3, whereby the moisture content of the web 1 exiting from the papermaking machine is controlled to a desired value at these cylinders. When leaving these last dryer cylinders 3, the web is passed supported by the wire 2 of the dryer section of the papermaking machine to a first applicator station 4. The applicator is a film-transfer coater in which the coating mix is first applied by an applicator apparatus 6 onto the surface of a film-transfer roll 5 and then in a nip formed between the film-transfer roll 5 and a backing roll 7 to the surface of the web being coated. The web 1 and the dryer wire 2 pass over the backing roll 7.

Operating in conjunction with the backing roll 7, there is disposed a noncontacting dryer 8 denoted by arrows pointed toward the web in the diagram. The noncontacting dryer can be implemented as an air or steam dryer, IR dryer, microwave dryer or other suitable type of noncontacting dryer. Most advantageously, the noncontacting dryer 8 is an impingement air dryer adapted to operate with air jets directed partially against the backing roll 7 of the film-transfer coater and partially against the dryer wire 2 over the length of the continuous wire supporting the web after leaving the backing roll. This arrangement provides a long drying travel in a noncontacting manner, simultaneously keeping the overall length of the wire loop and the travel length of the wire as short as possible. Still supported by the drying wire 2, the wire is passed from the backing roll 7 in the downstream direction to a first postdryer cylinder 9, where the coated side of the web 1 wraps the dryer cylinder 9 when pressed by the wire 2 against the surface of the cylinder 9. The surface of the dryer cylinder 9 may be surfaced with an antistick coating such as Teflon®

(PTFE) or, more advantageously, a pressurized dryer cylinder is used at which air or superheated steam is blown from within the cylinder against the web thus lowering the surface pressure of the web against the cylinder or even forcing the web off from the cylinder surface into a noncontacting floating position. The cylinder 9 in the present context must be understood to refer in a general sense to any part of a dryer cylinder group. Obviously, different types of dryer cylinder elements can be used in a dryer section in lieu of the one illustrated herein when varied embodiments of the invention are to be implemented.

At this stage, the web need not necessarily be dried to its final moisture content. The dryer wire 2 of the papermaking machine is passed from the first postdryer cylinder 9 over a guide roll to the return leg of the wire back toward the direction of the papermaking machine.

The web 1 being processed now leaves the dryer wire 2 and passes onto a second wire 11 that runs over a guide roll 12 so as to transfer and support the web in the following web treatment device. Over the distance from the post-dryer cylinder 9 to the guide roll 12 of the second wire 11, the web 1 travels without support by a wire. However, the web can be passed over such a short distance unsupportedly inasmuch the web is not subjected to any stressing treatment and the web is relatively dry, whereby it is most tolerant to a possible tensional stress due to variations in web draw. This open passage of web travel can be utilized for measuring various qualities of the paper using a measurement beam sensing the sheet from both sides. However, it is also possible to pass the web if so required directly in a supported manner from the dryer wire 2 to the next dryer wire 11 using any conventional supporting means.

The second wire 11 passes the web 1 to a dryer cylinder 13, where the web travels in a nip between the dryer cylinder 13 and the wire having the coated side of the web facing the wire 11, which requires the sheet-facing side of the wire to be sufficiently smooth. Alternatively, the cylinder 11 may be any cylinder of a dryer section or a web lead roll or draw roll or a set of such rolls. Supported web travel permits the drying process of the sheet to be controlled during the different treatment steps of the web 1 so that the drying and wetting of the base sheet during application takes place in an optimal manner and the penetration of water from the coating mix into the base sheet can be controlled.

From the predryer cylinder 13, the web is passed to a backing roll 7 of a second coater station 14. At this stage, the web 1 and the second wire 11 travel so that the wire passes through the nip between the web and the backing roll 7 and, simultaneously, the applicator roll 5 rests against the web 1, whereby it applies a coat layer to the uncoated side of the web 1. Next, the web is passed supported by the second wire 11 via a noncontacting dryer section to the first postdryer cylinder 9, where the coated side of the web wraps the cylinder surface. In this web treatment step, the contacting dryer is an inverted dryer cylinder group. With the help of the inverted group, the web can be passed from the upper, leaving group to the lower, receiving group and vice versa as is the case when the supported and treated sides of the web are to be reversed, e.g., for coating the opposed side of the web. In this embodiment, also the predryer cylinder 13 is disposed in a position corresponding to that of the inverted roll group, because the cylinder is the first dryer member to receive the web.

In Fig. 2 is shown an alternative embodiment of the

invention in which the web 1 leaving, e.g., the second coater station and its inverted roll group is passed to the next coating step and, simultaneously, the supported side of the web 1 is reversed, whereby the web is passed to run on a third wire 15. It must be noted that the web may as well be received from the wire of the papermaking machine. In the case that the wire is received from the first coater station, its both sides are already coated once, whereby the embodiment of Fig. 2 is used for applying a second coat layer. Therefore, the new layer of coating is applied in this embodiment to the first side of the web in a manner slightly different from that described above for the preceding coater stations 4, 14. Herein, the applicator roll 16 is a large-diameter cylinder having dimensions approximately equal to those of the dryer cylinders and the web wraps this cylinder 16 under the loading pressure imposed by said third wire 15. The coating is metered on the applicator roll 16 by means of an applicator apparatus 6 located under the applicator roll, whereby the coat can be transferred to the web 1 during the long dwell time of the web on the cylinder surface. The application pressure is imposed by means of said third wire 15 and if so required, the loading pressure may be increased with the help of a press roll 17 or a sliding shoe pressing the wire 15 and the underlying web 1 against the applicator roll 16. From the applicator roll 16, the web 1 passes about a guide roll 18 having a noncontacting dryer 8 adapted to cooperate therewith. Next to the noncontacting dryer is disposed a postdryer cylinder 9, wherefrom web travels over an unsupported passage to a fourth wire 18 and a fourth coater station 19. Herein, the path and coating operations of the web are equivalent to those of the first coating step carried out on the second side of the web. After the application of the second coat layer to the second side of the web, the web is dried to its final moisture content and passed to an winder or, alternatively, the

web can be passed to a calender, whereby the moisture content of the web must be controlled to a proper level for calendering.

5 To remove excess moisture from the web, the dryer cylinders may be complemented with air-impingement or suction hoods 20. The web support can be implemented with the help of various kinds of belt or wire elements. A basic requirement is that the structure and material of the  
10 elastic, continuous support element is compatible with the handling of the product being manufactured. In board manufacture, the wire may even have a coarse texture, while paper grades of high basis weight require a fine-weave wire and a low-weight paper grade must be supported  
15 using an extremely fine-weave wire, support belt or even a support band of substantially nonpermeable, smooth material. In principle, the lower the basis weight of the product the smoother the support element must be in order to avoid marks in the supported web. Respectively, the  
20 film-transfer roll of the applicator apparatus should preferably be of a soft-surfaced type, advantageously having a hardness in the range of 20 - 100 P&J when the film-transfer technique is being used for coating application.

25 In Fig. 3 is shown an embodiment according to the invention for a fully-supported web travel through a film-transfer coater. In this arrangement, both sides of the web 1 are treated at the same coater station. This  
30 embodiment is particularly suited to surface sizing, wherein the surface smoothness of support elements and cylinders are not decisive to the surface quality as in the actual coating application. The arrangement is fully free from unsupported web passages and the web is sup-  
35 ported throughout the web treatment process by a roll or a support element. Supported by the papermaking machine wire 2, the web enters the film-transfer coater from,

e.g., the dryer cylinder group of the papermaking machine over dryer cylinders 3 and turning rolls. After the last dryer cylinder, the wire 2 is arranged to pass around a cross-over roll 21. The cross-over roll 21 is wrapped by  
5 a cross-over support belt or wire 22 that also runs around a turning roll 23, whereby the web 1 is picked up at the cross-over roll between the papermaking machine wire 2 and the cross-over support wire 22. At the separation point of the wires 2 and 22, the cross-over support  
10 wire has been arranged to pick up the web 2 by means of a suction box adapted behind the cross-over support wire 22 or by selecting the wire materials and weave smoothnesses properly or by using a smooth transfer belt to which a dry web adheres with the help of static electricity or a  
15 wet web adheres due to adhesion forces which are stronger toward a smooth-surfaced belt than a permeable wire. The use of a smooth-surfaced belt is particularly advantageous in the above-described embodiment in which the web will not be dried to its final moisture content prior to  
20 its surface sizing or coating application. Furthermore, this arrangement requires less space than constructions performing web transfer from one support wire to another by means of a suction box.

25 From the support wire 2, the web is transferred to a first applicator roll 24 having a first applicator apparatus 26 adapted to cooperate therewith so as to apply a surface size, coating or other web treatment agent to the surface of the roll 24. Since the outer perimeter of the  
30 applicator roll 26 is wet due to the treatment agent metered thereon, the web 1 meeting the roll 24 readily adheres to the roll surface. Next, the web adhering to the surface of the first applicator roll 24 passes into the nip formed between the applicator rolls 24, 25, wherein  
35 it is transferred to wrap the surface of the second applicator roll 25. A second applicator apparatus 27 is used to apply the web treatment agent to the surface of

the second applicator roll. As the web 1 has been wrapping the perimeter of the first applicator roll by half a turn, it tends to continue its adherence to the roll surface. Hence, the surface properties of the first and the second applicator roll must be selected so that the web 1 has a greater preference to leave the nip by adhering to the surface of the second applicator roll 25. As the surfaces of both applicator rolls are wetted by the web treatment agent, the web separates more readily if the supporting surface has a coarser structure provided by a more hydrophilic material or, alternatively, the surface is made harder. Toward this end, the surface of the second applicator roll may be surfaced with a smooth, hydrophobic coating such as Teflon® (PTFE), whereby the surface of the first applicator roll is surfaced with another material of a coarser structure, such as rubber.

Over the surface of the second applicator roll 25 is adapted to run a dryer group wire 11 that is passed to the applicator roll over a turning roll 12. At this stage, an air-permeable wire or felt is advantageously used as the web support element, since this arrangement permits the web 1 to be easily transferred by means a suction box 28 adapted to the point where the wire 12 leaves the second applicator roll 25 to adhere to the wire 11. Next, the web passes supported by the wire 11 to a conventional dryer cylinder group, where the wire 11 presses the web against the surface of the dryer cylinders. In surface sizing, the web 1 can be passed directly to the dryer cylinders 3, and both sides of the web can be treated in the above-described manner simultaneously.

The method taught above for transferring a web from one support element to another by virtue of utilizing the differences in the adherence properties of the support elements may be advantageously employed in the arrange-

ments illustrated in Figs. 1 and 2, as well as any other embodiments covered by the scope and spirit of the invention.

- 5 In addition to those described above, the present invention may have alternative embodiments.

Web moisture content in the various web treatment steps can be adjusted optimal to achieve the desired end result  
10 of the coating application or web treatment process, because there is no more any need to dry the web between the treatment steps below the optimum moisture content of the process in order to achieve better runnability over the unsupported passages. As a fully supported web can be  
15 handled even when wet and unsupported passages are eliminated from the travel of the wet web, the web needs drying only so much as is necessary to pass the web supportedly through the next application step and to achieve, e.g., an optimal coat surface quality, coat  
20 weight or minimized specific energy consumption in drying. In this manner, the web treatment steps can be carried out at their optimal points of the papermaking process in regard to web moisture content, e.g., to manufacture a given paper grade, to eliminate web breakage  
25 for some paper grade or implement an energy management system of the process or to control some other kind of process variable.

Web support can be implemented using a continuous movable  
30 element which may be, e.g., a metal, polymer, glass fiber or carbon fiber belt, wire, felt or web or band. As discussed above, the surface properties of support element have a decisive role in the transfer of the web from one support element to another, which means that the permeability properties of the support element surfaces must  
35 be optimized so as to eliminate all separate web tail threading or support means from the web transfer and

threading system. The selection of the suitable support element type is also dependent on the dryer equipment used, whereby air-impingement and suction dryers conventionally require a gas-permeable support element for proper function, while infrared dryers and the like need the support element to be only resistant to the heat load imposed by the dryer.

The web support method according to the invention may also be used in combination with noncontacting web support arrangements so that the web is passed supported by air jets to a section utilizing the support system according to the invention or, respectively, is passed from the process line section utilizing the support system according to the invention to the next downstream located web treatment section, where the web is guided by means of an air-jet support system. The number of dryer cylinders before and after the web treatment section discussed herein may be varied as needed and the desired sections of the web processing line may be implemented using two-wire support in which the web is supported from both sides.

The web support elements may be grouped in many different fashions. In addition to those described above, the web may be guided so that a single continuous support element is used to pass the web from the first web treatment device all the way down to the next web treatment device. The application nip or area may be formed by pressing the support belt either directly against the web by means of the belt-tensioning force or by augmenting the loading pressure with a separate press roll or sliding shoe. When the web is passed from one support element to another, it can be passed via wire/web spreading means.

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Although the metering of the coating film in the above-described embodiments illustrating the use of a film-

transfer coater mention is made on the surface of an applicator roll, the coating film may as well be applied via a single belt in single-sided coating application and, in two-sided coating application, via two belts or one belt combined with an applicator roll. Accordingly, the invention is not limited to the use unrestrained drying, but instead, the web may be passed supported according to the invention directly to a dryer cylinder in a contacting manner unless other technical details of the process are contradictory to this.

Web support can be implemented over the distance from a hood-covered coater to a downstream located dryer so that the web postprocessing steps or the runnability and/or environmental aspects of the papermaking machine are taken into account with regard to good operability, control and maintenance. The hood can be divided into compartments, whereby the above-mentioned requirements are easier to meet by compartment. Web drying may also be carried out using two-sided drying. Herein, a metallic or heat-resistant polymer material belt can be used.

The methods according to the invention may be complemented with coat weight measurement means when the web travels supported on a belt or wire. Obviously, this excludes the use of two-sidedly located measurement equipment. A suitable gaging technique of, e.g., solids in the base sheet and coat weight for  $\text{CaCO}_3$ -based pigments is the x-ray fluorescence method. The x-ray fluorescence technique may be complemented with any conventional sheet basis weight and moisture content measurement means, whereby a plurality of sheet quality factors can be computed from the measurement data.

What is claimed is:

1. Method for supporting a web (1) during the post-processing of a web of paper or board, the method comprising the steps of:

- passing the web from a preceding section to at least one next downstream located web treatment section (4) wherein to at least one side of the web (1) is applied a treatment agent causing wetting of said side of said web, and

- passing the web (1) exiting said web treatment section to at least one dryer apparatus (8),

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c h a r a c t e r i z e d    i n    t h a t

- supporting the web (1) contactingly in a continuous and unbroken manner at least from said web treatment section (4) to said dryer (8).

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2. Method according to claim 1, c h a r a c t e r - i z e d by comprising the steps of

- drying the web (1) with at least one drying apparatus (3) prior to passing the web to said web treatment section (4), and

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- contactingly supporting the web in a continuous and unbroken manner at least from said drying apparatus (3) preceding said web treatment section (4) to said dryer apparatus (8) located downstream next to said web treatment section.

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3. Method according to claim 2, c h a r a c t e r - i z e d in that the web (1) is supported by means of a dryer wire (2) of a paper- or board making machine.

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4. Method according to claim 2 or 3, c h a r a c -  
t e r i z e d in that the web is passed supported by a  
continuous support element (2) at least from a drying  
5 apparatus (3) preceding said web treatment section (4) to  
the drying apparatus (8) located downstream next to said  
web treatment section.

5. Method according to claim 2, c h a r a c t e r -  
10 i z e d in that the web (1) is passed to at least one  
downstream located web treatment section (4) supported by  
the continuous support element of the upstream preceding  
web treatment section.

15 6. Method according to claim 1, c h a r a c t e r -  
i z e d in that the web (1) is passed supportedly and  
only partially dried from an upstream preceding web  
treatment section to the next downstream located web  
treatment section.

20 7. Method according to claim 4, c h a r a c t e r -  
i z e d in that the web (1) is supported by one and the  
same support element (2) through said web treatment  
section (4) and during the entire web travel through the  
25 next downstream located drying apparatus (8).

8. Method according to claim 1, c h a r a c t e r -  
i z e d in that the web (1) is supportedly passed from  
the upstream preceding, web-wetting treatment section to  
30 the next downstream located web treatment section and the  
web is dried so that at least a portion of the moisture  
content of the web is evaporated.

9. Method according to claim 6, c h a r a c t e r -  
35 i z e d in that the web (1) is passed to said web treat-  
ment section in a condition optimized with respect to the  
requirements of the paper grade being manufactured, the

investment costs, the frequency of web breakages, the overall energy consumption of the process, desired paper quality or the like target variable.

5 10. Method according to claim 1, c h a r a c t e r -  
i z e d in that the web is supported by means of a  
support element against a member of the web treatment  
apparatus, advantageously a film-transfer roll or blade  
coater, that serves to apply a web-wetting agent to the  
10 surface of the web.

11. Method according to claim 1, c h a r a c t e r -  
i z e d in that the web is dried by a microwave dryer,  
air-impingement dryer, contacting dryer, suction dryer or  
15 the like dryer means, wherein the web is supported by a  
member of a material suitable for resisting the impact of  
said drying apparatus.

12. Method according to claim 1 or 11, c h a r a c -  
20 t e r i z e d in that the web is supported by means of a  
belt or surfaced belt or fabric that is impermeable to  
moisture.

13. Method according to claim 1 or 11, c h a r a c -  
25 t e r i z e d in that the web is supported by means of a  
wire, fabric, porous felt or porous or perforated belt  
that is permeable or absorbent to a liquid or gaseous  
medium.

30 14. Method according to claim 1, c h a r a c t e r -  
i z e d in that at least one surface of the web is  
coated with a coating which is transferred with the help  
of a movable member passing through an application nip or  
area.

35 15. Method according to claim 14, c h a r a c t e r -  
i z e d in that said application nip or area is formed

by a loading element such as a roll, belt or sliding shoe.

16. Method according to claim 1, c h a r a c t e r -  
5 i z e d in that the web is supported in the first web treatment section by air-jet support means, after which the web is passed onto a contacting support element for spreading the web, subjecting the same to measurement of process qualities or supportingly passing the web to  
10 subsequent web treatment sections.

17. Method according to claim 1, c h a r a c t e r -  
i z e d in that the web is supported by a plurality of successive support elements and the web (1) is trans-  
15 ferred supportedly or guided by web guidance means (10) from one support element (2) to the next support element (11) in the succession.

18. Method according to claim 1 or 17, c h a r a c -  
20 t e r i z e d in that the web is passed from one support element to the next via web spreading or tension-controlling means.

19. Method according to claim 1 or 15, c h a r a c -  
25 t e r i z e d in that the web (1) is pressed against the surface of at least one roll serving to form a nip and apply a coating.

20. Method according to claim 1 or 15, c h a r a c -  
30 t e r i z e d in that the web (1) is pressed against the surface of at least one sliding shoe element serving to form a nip and allowing a coat-applying planar element to slide thereon.

21. Method according to claim 1, c h a r a c t e r -  
35 i z e d in that a first side of the web is supported by a movable continuous support element, while a coating is

applied to the second side of the web using, e.g., a spray-coating method, a jet-coating method, a blade/rod coater or an applicator roll coater.

5 22. Method according to claim 1 or 22, c h a r a c -  
t e r i z e d in that the web is adhered to the support  
element by means of air impingement or suction.

23. Method according to claim 1, 2, 4, 5, 6 or 8,  
10 c h a r a c t e r i z e d by comprising the steps of

- passing the web to a predryer cylinder group  
comprising at least one dryer cylinder and pressing  
the web against the cylinder by means of a single-  
15 wire support arrangement,

- supportedly passing the web to a treatment of the  
first side of the web, said web treatment comprising  
at least the application of a coating and the  
20 spreading/tensioning of the web, and

- passing the web to a like treatment of its second  
side and then by means of a single-wire support  
arrangement to a postdryer group.

25 24. Method according to claim 1, c h a r a c t e r -  
i z e d in that the web is supported by a succession of  
support elements (2, 22, 24, 25, 11) whose surface  
qualities are selected so that the adherence of the web  
30 at the cross-over point of said support elements is  
stronger to the downstream next, receiving support  
element than to the upstream preceding, delivering  
support element.

35 25. Method according to claim 24, c h a r a c t e r -  
i z e d in that the web is supported by elements in  
which the surface of the delivering support element is

more hydrophilic than the surface of the receiving support element.

26. Method according to claim 24, c h a r a c t e r -  
5 i z e d in that the web is supported by elements in which the surface of the delivering support element is softer than the surface of the receiving support element.

27. Method according to claim 24, c h a r a c t e r -  
10 i z e d in that the web is supported by elements in which the surface of the delivering support element (24) has a coarser texture than the surface of the receiving support element (25).

28. Method according to claim 24, 25, 26 or 27, in which  
15 method the web treatment device is a film-transfer coater, c h a r a c t e r i z e d by comprising the steps of

20 - passing the web (1) transferred on the support wire (2) of the dryer to a first support element (22),

- passing the web (1) from said first support element  
25 (22) onto the surface of a first film-transfer applicator roll (24),

- passing the web supported by the outer circumferen-  
tial surface of said first film-transfer applicator  
roll (24) onto a second film-transfer applicator roll  
30 (25), and

- passing the web supported by the outer circumferen-  
tial surface of said second film-transfer applicator  
roll (25) onto a next downstream located contacting  
35 support element (11).

29. Method according to claim 1 or 24, c h a r a c -

t e r i z e d in that the web is supported by means of a movable element that can be, e.g., a metal, polymer, glass fiber or carbon fiber belt, wire, felt or web or band.

5

30. Method according to claim 1, 15 or 24, c h a r -  
a c t e r i z e d in that the web is supported in the  
film-transfer coater by means of a support belt that  
serves to transfer a web treatment agent to the surface  
10 of the web.

31. Assembly for supportedly guiding a web (1) during  
the postprocessing of a web of paper or board, said  
assembly comprising

15

- at least one web treatment device (4),

- at least one device (3) preceding said web  
treatment device,

20

- elements (2) for passing the web (1) from said  
preceding device (3) to at least one next downstream  
located web treatment device (4) suited for applying  
to at least one surface of the web (1) a treatment  
25 agent that wets the web, and

- elements for passing the web (1) to at least one  
dryer (8) following said web treatment device,

30

c h a r a c t e r i z e d by

- at least one support element (2) for passing the  
web (1) in a continuous and unbroken manner at least  
from said web treatment device to said next down-  
stream located dryer.

35

32. Assembly according to claim 31, c h a r a c t e r -

i z e d by

- at least one dryer (3) for drying the web prior to passing the web to said web treatment device (4), and

5

- a support element for contactingly supporting the web (1) in a continuous and unbroken manner at least from said dryer (3) preceding said web treatment device (4) to said dryer (8) located downstream next

10

to said web treatment device.

33. Assembly according to claim 31, c h a r a c t e r - i z e d in that said element for passing the web (1) is a dryer wire (2) of a paper or boardmaking machine.

15

34. Assembly according to claim 31, c h a r a c t e r - i z e d by a single continuous support element (2) being used for passing the web in a supported manner at least from said dryer (3) preceding said web treatment device (4) to said dryer (8) located downstream next to said web treatment device.

20

35. Assembly according to claim 31, c h a r a c t e r - i z e d by a single continuous support element being used for passing the web (1) to at least one next downstream web treatment device from an upstream preceding web treatment device.

25

36. Assembly according to claim 35, c h a r a c t e r - i z e d by one and the same support element (2) being used for supporting the web (1) through said web treatment device (4) and during the entire web travel through the next downstream located dryer (8).

30

37. Assembly according to claim 31, c h a r a c t e r - i z e d by having at least one support element adapted to support the web (1) so as press the web against a

35

member of the web treatment section, advantageously a film-transfer roll or blade coater, that serves to apply a web-wetting agent to the surface of the web.

5 38. Assembly according to claim 31, c h a r a c t e r -  
i z e d by at least one microwave dryer, air-impingement  
dryer, contacting dryer, suction dryer or the like dryer  
apparatus, wherein the web is supported by a member of a  
material suitable for resisting the impact of said dryer.

10 39. Assembly according to claim 31 or 38, c h a r a c -  
t e r i z e d in that said support element is a belt or  
surfaced belt/fabric that is impermeable to moisture.

15 40. Assembly according to claim 31 or 38, c h a r a c -  
t e r i z e d in that said support member is a fabric,  
porous felt or porous/perforated belt that is permeable  
or absorbent to a liquid or gaseous medium.

20 41. Assembly according to claim 31, c h a r a c t e r -  
i z e d by at least one movable element capable of  
defining at least one application nip or area in which  
nip or area at least one surface of the web is coated  
with a coating transferred with the help of said movable  
25 member passing through said application nip or area.

42. Assembly according to claim 41, c h a r a c t e r -  
i z e d by having said application nip or area defined  
with the help of a loading element such as a roll, belt  
30 or sliding shoe.

43. Assembly according to claim 31, c h a r a c t e r -  
i z e d by a plurality of successive support elements  
serving to support the web and to transfer the web (1)  
35 supportedly or guided by web guidance means (10) from one  
support element (2) to the next support element (11) in  
the succession.

44. Assembly according to claim 31, c h a r a c t e r -  
i z e d by means for supportedly pressing a first side  
of the web against a movable continuous support element  
5 and means for applying a coating to the second side of  
the web using, e.g., a spray-coating method, a jet-  
coating method, a blade/rod coater or an applicator roll  
coater.

10 45. Assembly according to claim 31 or 44, c h a r a c -  
t e r i z e d by air-impingement or suction means for  
adhering the web to the support element.

15 46. Assembly according to claim 31, c h a r a c t e r -  
i z e d in that the surface of the support element is  
patterned with a desired surface texture serving to make  
a desired surface or base coating pattern on the web side  
to be treated.

20 47. Assembly according to claim 31, c h a r a c t e r -  
i z e d by a succession of support elements (2, 22, 24,  
25, 11) serving to support the web, said support elements  
having their surface qualities so selected as to make the  
adherence of the web at the cross-over point of said sup-  
25 port elements stronger to the downstream next, receiving  
support element than to the upstream preceding, deliver-  
ing support element.

30 48. Assembly according to claim 47, c h a r a c t e r -  
i z e d in that the surface of the delivering element is  
more hydrophilic than the surface of the receiving  
element.

35 49. Assembly according to claim 47, c h a r a c t e r -  
i z e d in that the surface of the delivering element  
(24) has a coarser texture than that of the surface of  
the receiving element (25).

50. Assembly according to claim 47, c h a r a c t e r -  
i z e d in that the surface of the delivering element  
(24) is softer than the surface of the receiving element  
5 (25).

51. Assembly according to claim 47, 48 or 49, in which  
system said web treatment device is a film-transfer  
coater, c h a r a c t e r i z e d by

10 - a support wire (2) of the dryer serving to pass the  
web (1) to a first support element (22) on which the  
web (1) is transferred onto the surface of a first  
film-transfer applicator roll (24),

15 - a second film-transfer applicator roll (25) serving  
to receive the web which has been transferred and  
supported by the surface of the first film-transfer  
applicator roll (24), and

20 - a next downstream located, contacting support  
element (11) serving to receive the web (1) which has  
been transferred and supported by the surface of the  
second film-transfer applicator roll (25).

25 52. Assembly according to claim 30 or 47, c h a r a c -  
t e r i z e d in that the web is supported by means of a  
movable element that can be, e.g., a metal, polymer,  
glass fiber or carbon fiber belt, wire, felt or web or  
30 band.

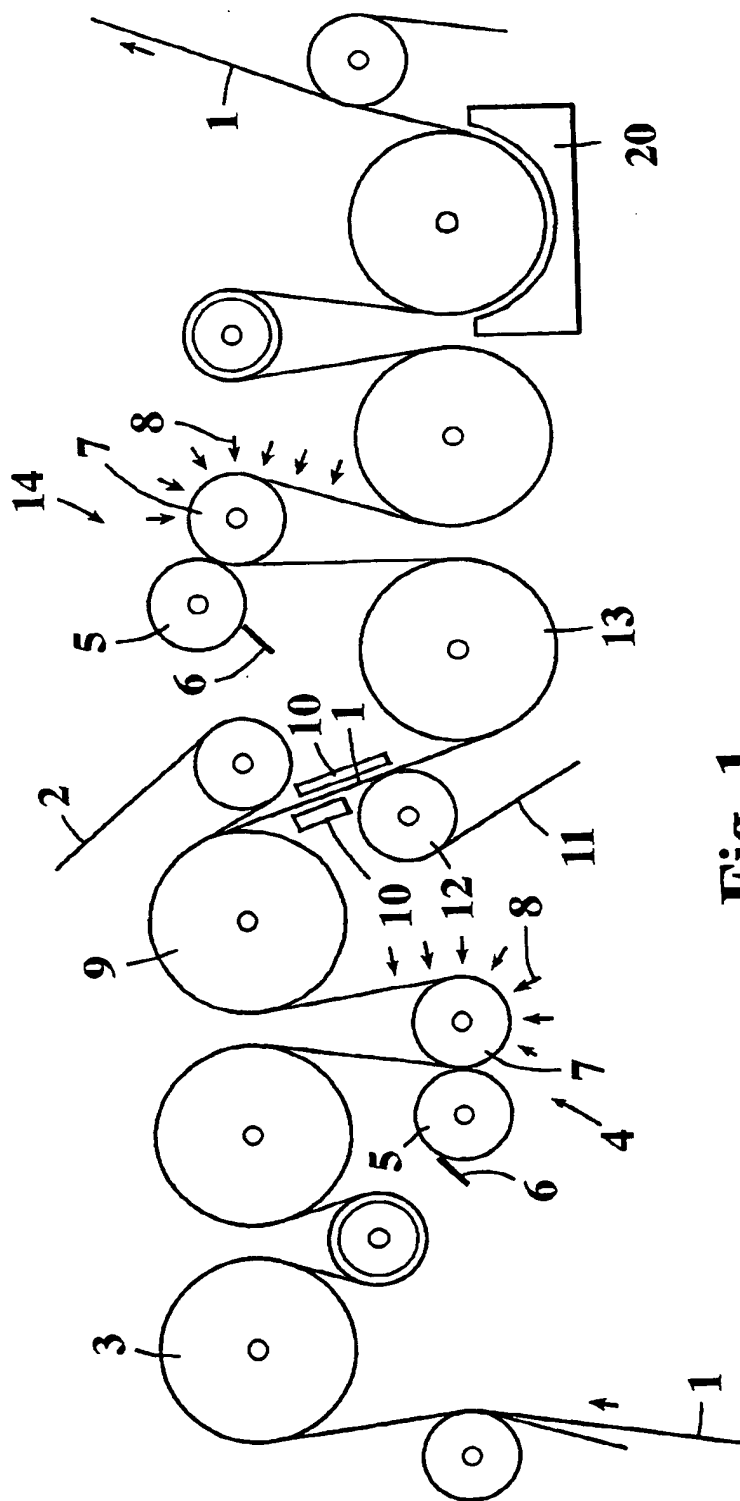


Fig. 1

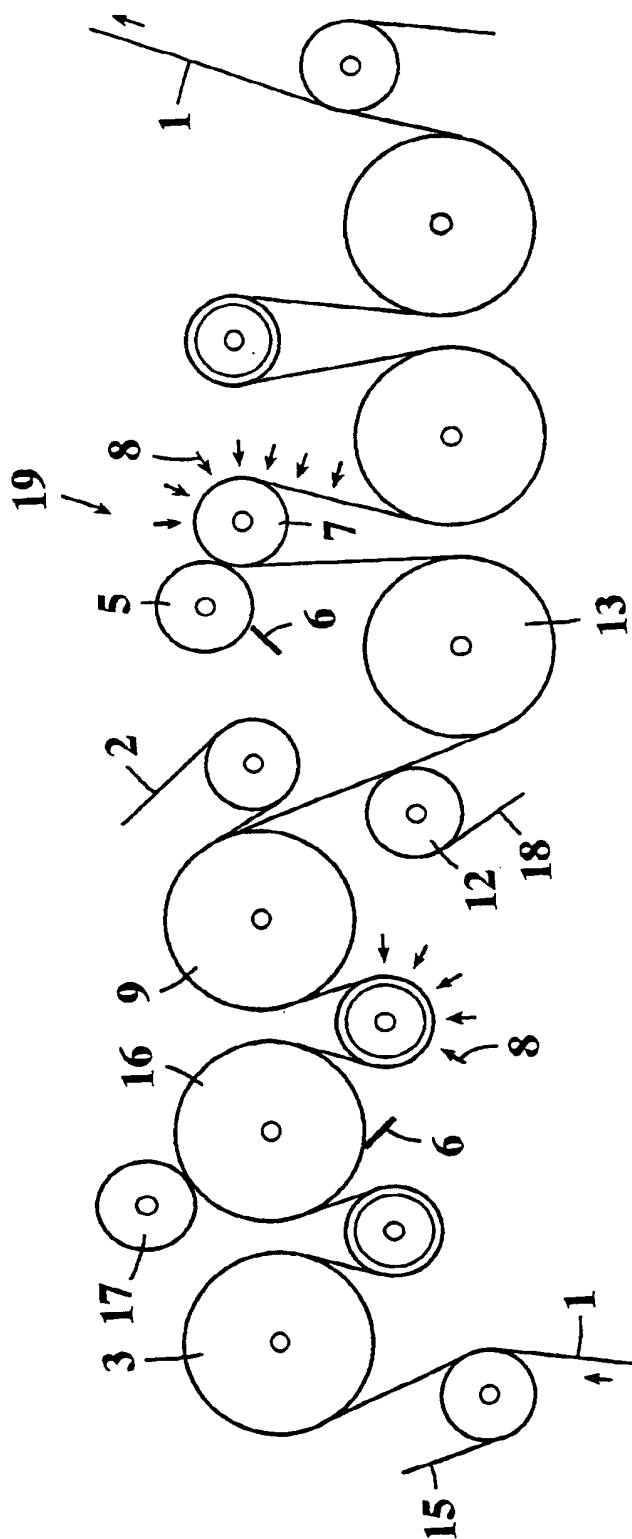


Fig. 2

3/3

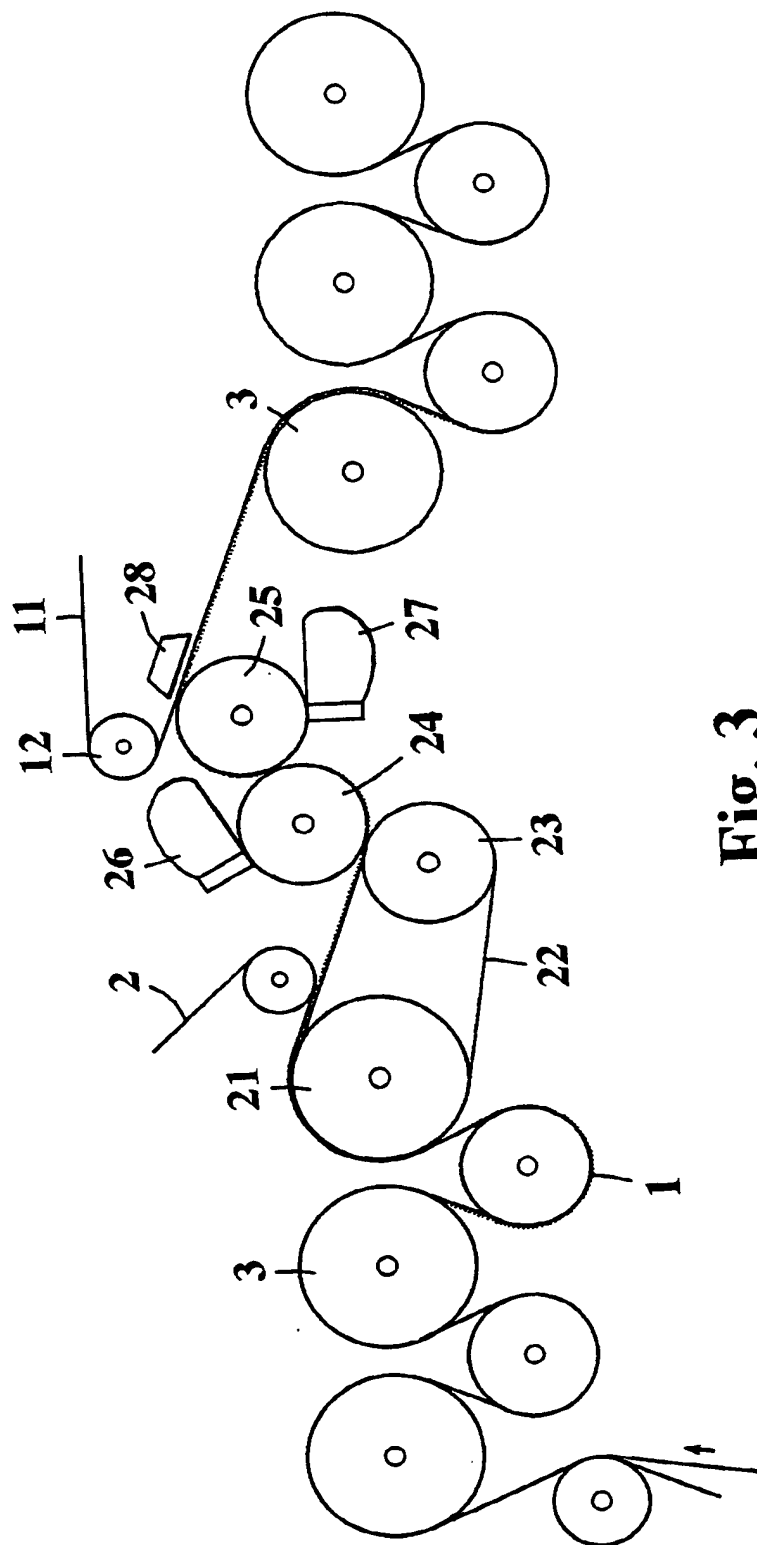


Fig. 3

## PATENT COOPERATION TREATY

PCT

NOTIFICATION OF THE RECORDING  
OF A CHANGE(PCT Rule 92bis.1 and  
Administrative Instructions, Section 422)

From the INTERNATIONAL BUREAU

To:

SEPPO LAINE OY  
Itämerenkatu 3 B  
FIN-00180 Helsinki  
FINLANDE

Date of mailing (day/month/year) 15 June 2001 (15.06.01)	<b>IMPORTANT NOTIFICATION</b>
Applicant's or agent's file reference VAL 141 PCT	
International application No. PCT/FI00/00008	
International filing date (day/month/year) 05 January 2000 (05.01.00)	

1. The following indications appeared on record concerning:
- ☒ the applicant    ☐ the inventor    ☐ the agent    ☐ the common representative

Name and Address VALMET CORPORATION Fabianinkatu 9 A FIN-00130 Helsinki Finland	State of Nationality FI	State of Residence FI
	Telephone No.	
	Facsimile No.	
	Teleprinter No.	

2. The International Bureau hereby notifies the applicant that the following change has been recorded concerning:
- ☐ the person    ☒ the name    ☐ the address    ☐ the nationality    ☐ the residence

Name and Address METSO PAPER, INC. Fabianinkatu 9 A FIN-00130 Helsinki Finland	State of Nationality	State of Residence
	Telephone No.	
	Facsimile No.	
	Teleprinter No.	

3. Further observations, if necessary:

4. A copy of this notification has been sent to:

- ☒ the receiving Office    ☐ the designated Offices concerned
- ☐ the International Searching Authority    ☒ the elected Offices concerned
- ☐ the International Preliminary Examining Authority    ☐ other:

The International Bureau of WIPO 34, chemin des Colombettes 1211 Geneva 20, Switzerland	Authorized officer J. Leitao
Facsimile No.: (41-22) 740.14.35	Telephone No.: (41-22) 338.83.38

# PATENT COOPERATION TREATY

## PCT

### NOTIFICATION OF ELECTION

(PCT Rule 61.2)

From the INTERNATIONAL BUREAU

To:

Assistant Commissioner for Patents  
United States Patent and Trademark  
Office  
Box PCT  
Washington, D.C. 20231  
ETATS-UNIS D'AMERIQUE

in its capacity as elected Office

Date of mailing (day/month/year)  
18 August 2000 (18.08.00)

International application No.  
PCT/FI00/00008

Applicant's or agent's file reference  
VAL 141 PCT

International filing date (day/month/year)  
05 January 2000 (05.01.00)

Priority date (day/month/year)  
05 January 1999 (05.01.99)

Applicant

RANTANEN, Rauno et al

1. The designated Office is hereby notified of its election made:

☒ in the demand filed with the International Preliminary Examining Authority on:  
20 June 2000 (20.06.00)

☐ in a notice effecting later election filed with the International Bureau on:

2. The election ☒ was

☐ was not

made before the expiration of 19 months from the priority date or, where Rule 32 applies, within the time limit under Rule 32.2(b).

The International Bureau of WIPO  
34, chemin des Colombettes  
1211 Geneva 20, Switzerland

Facsimile No.: (41-22) 740.14.35

Authorized officer

Claudio Borton

Telephone No.: (41-22) 338.83.38

**V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement****1. Statement**

Novelty (N)	Claims	<u>1-52</u>	YES
	Claims		NO
Inventive step (IS)	Claims	<u>1-52</u>	YES
	Claims		NO
Industrial applicability (IA)	Claims	<u>1-52</u>	YES
	Claims		NO

**2. Citations and explanations (Rule 70.7)**

The claimed invention relates to a method and assembly for supporting a paper web through the finishing equipment. The invention aims at solving the problem with web breaks occurring especially in stages where the paper web is wet. The problem is solved by continuously supporting the web in a contacting manner all the way through the coating applicator and to at least a subsequent dryer. The web can be supported by means of a wire, a fabric, a felt or a belt. By supporting the wet web at critical stages, the moisture content can be kept at a level optimal to the desired end product qualities.

**Documents cited:**

D1: US 5547509

D1 is considered to come closest to the invention. D1 discloses an apparatus for supporting a paper web through a coating installation. However, the paper web is separated from the support belt prior to the drying means and D1 does thus not disclose a continuous support all the way to the dryer. The invention is focused on preventing web breaks in the coating installation and does not discuss other potential points of web breaks. The possibility of processing the web at a higher moisture content is not at all discussed in the document.

The invention according to claims 1-52 is therefore novel and considered to involve an inventive step. The invention is furthermore considered to be industrially applicable.

## PCT

## INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

REC'D 20 APR 2001

WIPO

PCT

14

Applicant's or agent's file reference VAL 141 PCT	<b>FOR FURTHER ACTION</b> See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)	
International application No. PCT/FI00/00008	International filing date (day/month/year) 05.01.2000	Priority date (day/month/year) 05.01.1999
International Patent Classification (IPC) or national classification and IPC <sub>7</sub> D21H 23/26		
Applicant Valmet Corporation et al		

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.

2. This REPORT consists of a total of 3 sheets, including this cover sheet.

☐ This report is also accompanied by ANNEXES, i.e., sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

These annexes consist of a total of \_\_\_\_\_ sheets.

3. This report contains indications relating to the following items:

- I ☒ Basis of the report
- II ☐ Priority
- III ☐ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- IV ☐ Lack of unity of invention
- V ☒ Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- VI ☐ Certain documents cited
- VII ☐ Certain defects in the international application
- VIII ☐ Certain observations on the international application

Date of submission of the demand  20.06.2000	Date of completion of this report  05.04.2001
Name and mailing address of the IPEA/SE Patent- och registreringsverket Box 5055 S-102 42 STOCKHOLM Facsimile No. 08-667 72 88	Authorized officer  Marie Karlsson / MRo Telephone No. 08-782 25 00

## PATENT COOPERATION TREATY

## PCT

## INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference VAL 141 PCT	<b>FOR FURTHER ACTION</b> See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)	
International application No. PCT/FI00/00008	International filing date (day/month/year) 05.01.2000	Priority date (day/month/year) 05.01.1999
International Patent Classification (IPC) or national classification and IPC D21H 23/26		
Applicant Valmet Corporation et al		

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.

2. This REPORT consists of a total of 3 sheets, including this cover sheet.

☐ This report is also accompanied by ANNEXES, i.e., sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

These annexes consist of a total of \_\_\_\_\_ sheets.

3. This report contains indications relating to the following items:

- I ☒ Basis of the report
- II ☐ Priority
- III ☐ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- IV ☐ Lack of unity of invention
- V ☐ Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- VI ☐ Certain documents cited
- VII ☐ Certain defects in the international application
- VIII ☐ Certain observations on the international application

Date of submission of the demand 20.06.2000	Date of completion of this report 05.04.2001
Name and mailing address of the IPEA/SE Patent- och registreringsverket Box 5055 S-102 42 STOCKHOLM Facsimile No. 08-667 72 88	Authorized officer Marie Karlsson / MRO Telephone No. 08-782 25 00

**I. Basis of the report****1. With regard to the elements of the international application:\***

- ☒ the international application as originally filed
- ☐ the description:  
pages \_\_\_\_\_, as originally filed  
pages \_\_\_\_\_, filed with the demand  
pages \_\_\_\_\_, filed with the letter of \_\_\_\_\_
- ☐ the claims:  
pages \_\_\_\_\_, as originally filed  
pages \_\_\_\_\_, as amended (together with any statement) under article 19  
pages \_\_\_\_\_, filed with the demand  
pages \_\_\_\_\_, filed with the letter of \_\_\_\_\_
- ☐ the drawings:  
pages \_\_\_\_\_, as originally filed  
pages \_\_\_\_\_, filed with the demand  
pages \_\_\_\_\_, filed with the letter of \_\_\_\_\_
- ☐ the sequence listing part of the description:  
pages \_\_\_\_\_, as originally filed  
pages \_\_\_\_\_, filed with the demand  
pages \_\_\_\_\_, filed with the letter of \_\_\_\_\_

**2. With regard to the language, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.**

These elements were available or furnished to this Authority in the following language \_\_\_\_\_ which is:

- ☐ the language of a translation furnished for the purposes of international search (under Rule 23.1(b)).
- ☐ the language of publication of the international application (under Rule 48.3(b)).
- ☐ the language of the translation furnished for the purposes of international preliminary examination (under Rules 55.2 and/or 55.3).

**3. With regard to any nucleotide and/or amino acid sequence disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:**

- ☐ contained in the international application in written form.
- ☐ filed together with the international application in computer readable form.
- ☐ furnished subsequently to this Authority in written form.
- ☐ furnished subsequently to this Authority in computer readable form.
- ☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
- ☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

**4. ☐ The amendments have resulted in the cancellation of:**

- ☐ the description, pages \_\_\_\_\_
- ☐ the claims, Nos. \_\_\_\_\_
- ☐ the drawings, sheet/fig \_\_\_\_\_

**5. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2 (c)).\*\***

\* Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are annexed to this report since they do not contain amendments (Rules 70.16 and 70.17).

\*\* Any replacement sheet containing such amendments must be referred to under item I and annexed to this report.

The International Bureau of WIPO  
34, chemin des Colombettes  
1211 Geneva 20  
Switzerland

TELEFAX  
(1 PAGE)

29 May 2001

VIITTEENNE:  
YOUR REFERENCE:

VIITTEEMME:  
OUR REFERENCE:

VAL 141 PCT

Re: International Patent Application No. PCT/FI00/00008  
New Applicant: Metso Paper, Inc.  
International Filing Date: 5 January 2000

Dear Sirs,

The new name of the applicant is

address: **Metso Paper, Inc.**  
Fabianinkatu 9 A  
FIN-00130 Helsinki  
Finland

state of  
nationality: Finland  
state of  
residence: Finland

which is the new applicant for all designated and elected states except the United States of America.

Please record the change and inform the elected offices thereof.

A new power of attorney will follow as soon as possible.

Yours faithfully,  
Seppo Laine Oy

Simo Hovi

/ha

SEPPÖ LÄINE OY

PL 339 P.O.B. 339  
00181 HELSINKI, FINLAND

TOIMISTO - OFFICE  
ITÄMERENKATU 3B  
00180 HELSINKI, FINLAND

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RY:N JÄSEN

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REG. No. 342.419

PANKKI BANK  
MERITA (SW: MRITFIHH)  
215316-6013E

POSTISIIRTO POSTGIRO  
80001E-110851E

The demand must be filed directly with the competent International Preliminary Examining Authority or, if two or more Authorities are competent, with the one chosen by the applicant. The full name or two-letter code of that Authority may be indicated by the applicant on the line below:

IPEA/ SE

# PCT

## CHAPTER II

### DEMAND

under Article 31 of the Patent Cooperation Treaty:

The undersigned requests that the international application specified below be the subject of international preliminary examination according to the Patent Cooperation Treaty and hereby elects all eligible States (except where otherwise indicated).

For International Preliminary Examining Authority use only	
Identification of IPEA	Date of receipt of DEMAND
<b>Box No. I IDENTIFICATION OF THE INTERNATIONAL APPLICATION</b>	
Applicant's or agent's file reference VAL 141 PCT	
International application No. PCT/FI00/00008	International filing date (day/month/year) 05 January 2000 (05.01.00)
(Earliest) Priority date (day/month/year) 05 January 1999 (05.01.99)	
Title of invention Method and assembly for supporting a paper and board web in finishing equipment	
<b>Box No. II APPLICANT(S)</b>	
Name and address: (Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country.)	
VALMET CORPORATION Fabianinkatu 9 A FIN-00130 Helsinki Finland	
Telephone No.:	
Facsimile No.:	
Teleprinter No.:	
State (that is, country) of nationality: Finland	State (that is, country) of residence: Finland
Name and address: (Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country.)	
RANTANEN, Rauno Oksalanmäki FIN-40950 Muurame Finland	
State (that is, country) of nationality: Finland	State (that is, country) of residence: Finland
Name and address: (Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country.)	
LIPPONEN, Juha Ruusalantie 2 as. 1 FIN-40270 Palokka Finland	
State (that is, country) of nationality: Finland	State (that is, country) of residence: Finland
<input type="checkbox"/> Further applicants are indicated on a continuation sheet.	

**Box No. III AGENT OR COMMON REPRESENTATIVE; OR ADDRESS FOR CORRESPONDENCE**The following person is ☒ agent ☐ common representativeand ☒ has been appointed earlier and represents the applicant(s) also for international preliminary examination.☐ is hereby appointed and any earlier appointment of (an) agent(s)/common representative is hereby revoked.☐ is hereby appointed, specifically for the procedure before the International Preliminary Examining Authority, in addition to the agent(s)/common representative appointed earlier.Name and address: *(Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country.)*SEPPO LAINE OY  
Itämerenkatu 3 B  
FIN-00180 Helsinki  
Finland

Telephone No.:

+358-9-68 59 560

Facsimile No.:

+358-9-6859 5610

Teleprinter No.:

☐ **Address for correspondence:** Mark this check-box where no agent or common representative is/has been appointed and the space above is used instead to indicate a special address to which correspondence should be sent.**Box No. IV BASIS FOR INTERNATIONAL PRELIMINARY EXAMINATION****Statement concerning amendments:\***

1. The applicant wishes the international preliminary examination to start on the basis of:

☒ the international application as originally filed  
the description ☐ as originally filed  
☐ as amended under Article 34the claims ☐ as originally filed  
☐ as amended under Article 19 (together with any accompanying statement)  
☐ as amended under Article 34the drawings ☐ as originally filed  
☐ as amended under Article 342. ☐ The applicant wishes any amendment to the claims under Article 19 to be considered as reversed.3. ☐ The applicant wishes the start of the international preliminary examination to be postponed until the expiration of 20 months from the priority date unless the International Preliminary Examining Authority receives a copy of any amendments made under Article 19 or a notice from the applicant that he does not wish to make such amendments (Rule 69.1(d)). *(This check-box may be marked only where the time limit under Article 19 has not yet expired.)*

\* Where no check-box is marked, international preliminary examination will start on the basis of the international application as originally filed or, where a copy of amendments to the claims under Article 19 and/or amendments of the international application under Article 34 are received by the International Preliminary Examining Authority before it has begun to draw up a written opinion or the international preliminary examination report, as so amended.

Language for the purposes of international preliminary examination: English☒ which is the language in which the international application was filed.☐ which is the language of a translation furnished for the purposes of international search.☐ which is the language of publication of the international application.☐ which is the language of the translation (to be) furnished for the purposes of international preliminary examination.**Box No. V ELECTION OF STATES**The applicant hereby elects all eligible States *(that is, all States which have been designated and which are bound by Chapter II of the PCT)*

excluding the following States which the applicant wishes not to elect:

**Box No. VI CHECK LIST**

The demand is accompanied by the following elements, in the language referred to in Box No. IV, for the purposes of international preliminary examination:

- |  |   |        |
|--|---|--------|
| 1. translation of international application                              | : | sheets |
| 2. amendments under Article 34   | : | sheets |
| 3. copy (or, where required, translation) of amendments under Article 19 | : | sheets |
| 4. copy (or, where required, translation) of statement under Article 19  | : | sheets |
| 5. letter  | : | sheets |
| 6. other ( <i>specify</i> )  | : | sheets |

For International Preliminary Examining Authority use only

received                      not received

<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>

The demand is also accompanied by the item(s) marked below:

- |  |   |
|--|---|
| 1. <input checked="" type="checkbox"/> fee calculation sheet                             | 4. <input type="checkbox"/> statement explaining lack of signature                                  |
| 2. <input type="checkbox"/> separate signed power of attorney                            | 5. <input type="checkbox"/> nucleotide and or amino acid sequence listing in computer readable form |
| 3. <input type="checkbox"/> copy of general power of attorney; reference number, if any: | 6. <input type="checkbox"/> other ( <i>specify</i> ):   |

**Box No. VII SIGNATURE OF APPLICANT, AGENT OR COMMON REPRESENTATIVE**

*Next to each signature, indicate the name of the person signing and the capacity in which the person signs (if such capacity is not obvious from reading the demand).*

For the Applicants

Seppo Laine Oy

Simo Hovi

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- |  |   |
|--|---|
| 1. Date of actual receipt of DEMAND:   |   |
| 2. Adjusted date of receipt of demand due to CORRECTIONS under Rule 60.1(b):   |   |
| 3. <input type="checkbox"/> The date of receipt of the demand is AFTER the expiration of 19 months from the priority date and item 4 or 5, below, does not apply.                        | <input type="checkbox"/> The applicant has been informed accordingly. |
| 4. <input type="checkbox"/> The date of receipt of the demand is WITHIN the period of 19 months from the priority date as extended by virtue of Rule 80.5.                               |   |
| 5. <input type="checkbox"/> Although the date of receipt of the demand is after the expiration of 19 months from the priority date, the delay in arrival is EXCUSED pursuant to Rule 82. |   |

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Demand received from IPEA on: